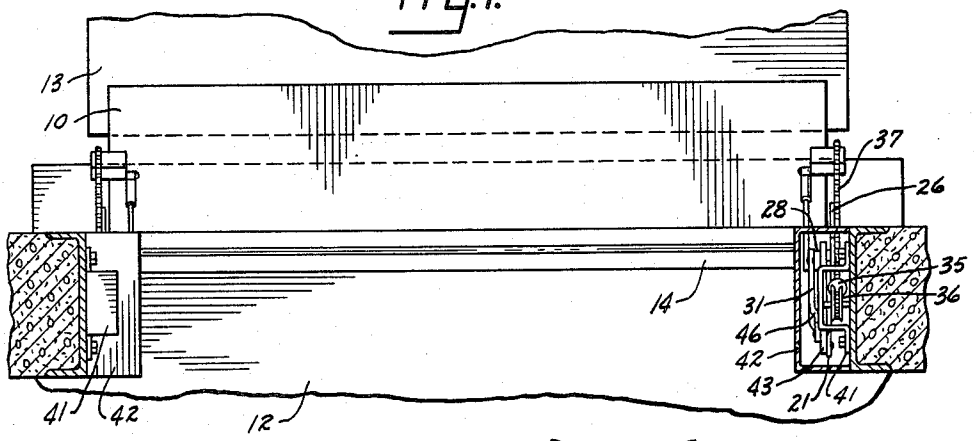
Feb. 16, 1960 E. E. ALEXANDER 2,924,859

GATE-ACTUATED OPERATING MECHANISM FOR TRUCKING SILLS

Filed Oct. 14, 1957

Fig. 1.



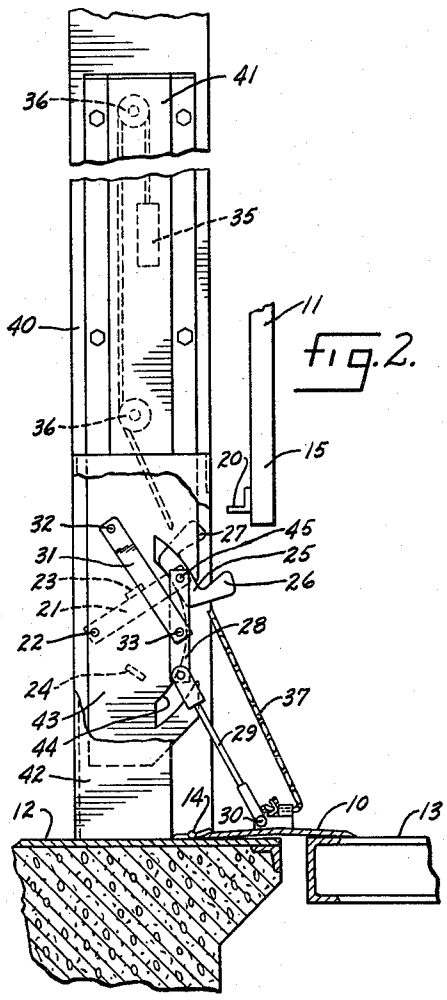
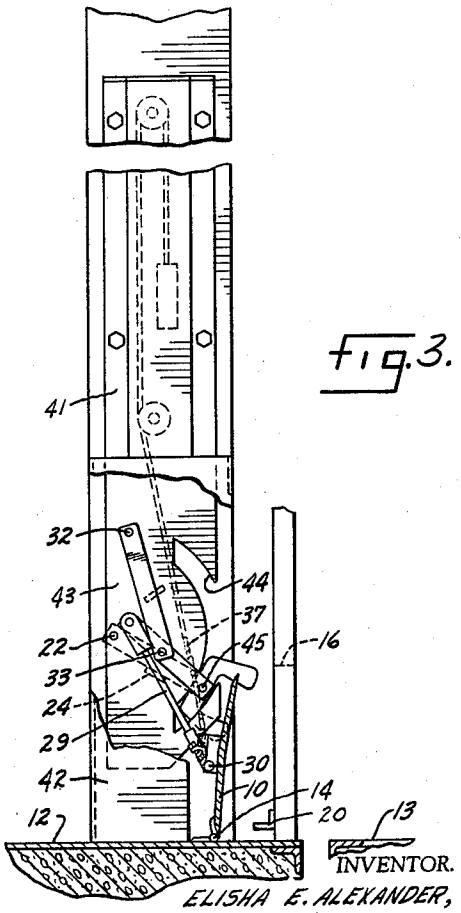


Fig. 2.

Fig. 3.



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GATE-ACTUATED OPERATING MECHANISM FOR TRUCKING SILLS

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10 Claims. (Cl. 20—19)

This invention relates to trucking sills for use with elevators and, more particularly, is concerned with an operating mechanism for automatically positioning a trucking sill in response to the movement of a gate that shifts vertically from a lower position wherein it blocks the entrance to the elevator to an upper position wherein it is bridged above the entrance to the elevator.

In the usual arrangement, a certain operating clearance is provided between an elevator and the structure surrounding the elevator hatch so that a horizontal gap exists between the floor of the elevator and the floors or platforms bordering the hatch. Trucking sills for bridging these gaps are known, but for maximum safety and convenience, it is important that the sills and elevator entrance gate operate conjointly so that as the gate moves from its blocking position within the entrance to its bridging position above the entrance, the sill will move from a blocking position wherein it may extend vertically to cooperate with the gate in blocking off the elevator entrance to a bridging position wherein it spans the clearance gap.

Such an arrangement for use with a horizontally split door having upper and lower door sections shiftable in opposite vertical directions is shown in my U.S. Patent 2,473,125.

The principal object of the present invention is to provide an operating mechanism for automatically controlling the positioning of a trucking sill in accordance with the movements of a single-section gate or door that shifts vertically between a lower blocking position and an upper bridging position.

Another object is to provide an operating mechanism arranged to undergo overcenter travel as it approaches its opposite limits of movement to prevent displacement of the sill except upon actuation by the gate.

Still another object is to provide a counterbalanced sill arrangement so that as the sill approaches its bridging position, its weight predominates and carries the operating mechanism overcenter independently of the gate but as the sill approaches its upraised or blocking position, the counterweight predominates and carries the operating mechanism overcenter independently of the gate.

Other objects and advantages will become apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same:

Fig. 1 is a plan view through the entrance to an elevator with certain parts of one of the chambered door posts broken away;

Fig. 2 is a side view through one of the door posts with parts broken away to illustrate the arrangement of the operating mechanism when the trucking sill is in its bridging position; and

Fig. 3 is a view similar to Fig. 2 except with the trucking sill shown in its upraised, or blocking, position in the elevator entrance.

For purposes of disclosure, the trucking sill **10** and hatch gate **11** are shown applied to a supporting structure that has a floor **12** bordering a hatchway in which the floor **13** of an elevator car is vertically shiftable. The sill **10** is connected to the building floor by suitable hinges **14** for reversible swinging movement in the entrance to the elevator between a lower, or horizontal, bridging position (see Fig. 2), wherein it spans the juxtaposed edges of the floors **12** and **13** and an upraised, or vertical, blocking position (see Fig. 3), wherein it closes off the bottom region of the entrance.

Such a sill arrangement is particularly useful with gates that include downwardly-projecting legs **15** at their opposite sides for establishing supporting engagement with the floor. Thus, with the gate legs **15** engaging the floor **12**, the large center region of the gate, as indicated by dotted lines **16** in Fig. 3, is spaced well above the floor. The sill **10**, when in its upraised position, is preferably arranged to block substantially the entire region between the floor and the bottom of the gate **11** and since the sill is locked against accidental displacement from either of its extreme positions (as will be explained hereinafter), it protects the gate from being smashed by trucks, and it also prevents material from dropping or rolling into the elevator hatch.

As is apparent from Fig. 1, each end of the sill is provided with an operating mechanism. These mechanisms are identical, and a single description will suffice.

Each operating mechanism includes an actuating arm or pawl **20** fixedly carried by one of the gate legs **15** to undergo substantially linear reciprocating vertical movement for reversibly driving a sill-operating cam **21**. The cam is mounted for swinging movement about a fixed pivot **22** to swing above and below an approximately central horizontal position. The swinging movement of the cam arm is limited by upper and lower stops **23** and **24** respectively. The cam portion itself is in the form of a fork **25** that opens towards the pawl **20**, with the fork having a lower arm **26** engageable by the pawl during a portion of the downward movement of the gate **11** and an upper arm **27** engageable with the pawl during a portion of the upward movement of the gate. At an intermediate point the cam arm is pivoted to one end of a floating link **28**, the opposite end of which is pivotally connected to a rigid operating rod **29** which is pivotally mounted to the sill, as shown at **30**. The linkage arrangement includes a releasing link **31** mounted for swinging movement about a fixed pivot **32**, with its free end pivoted to an intermediate point **33** of the floating link **28**.

It should be apparent that as the pawl **20** is carried downwardly by the gate **11**, it engages the lower arm **26** of the fork-shaped cam and drives it from the position in which it is illustrated in Fig. 2, beyond its horizontal central position, and to a downwardly-inclined intermediate position short of its lower limit of movement. At this intermediate position, the swinging movement of the cam carries the arm **26** out of the line of action of the pawl, and further downward movement of the gate does not affect the operating mechanism for the sill.

Similarly, when the gate is being raised, the pawl engages the upper arm **27** of the fork-shaped cam and drives it from the position in which it is illustrated in Fig. 3, through its horizontal central position, and to an upwardly-inclined intermediate position short of its upper limit of movement. At this latter intermediate position, the swinging movement of the cam carries the arm **27** out of the line of action of the pawl and further upward movement of the gate does not affect the operating mechanism for the sill.

To insure that the cam and sill complete their swinging movements, a counterweight **35** suspended from suitable sheaves **36** by means of a flexible chain **37** that connects to the sill is arranged to balance with the sill

at a sill position approximately midway between its extremes of movement.

Thus, during downward movements of the gate, the sill is approaching a vertical position under the influence of the direct engagement between the pawl **20** and the cam and the effective lever arm of the center of gravity of the sill with respect to the sill hinges **14** becomes quite small so that the counterweight **35** predominates and imposes a force that carries the sill **10** to its upper limit position as determined by the limit stop **23** which engages the cam. Similarly, as the gate is being raised and the sill approaches its horizontal bridging position, the effective lever arm of its center of gravity is approaching a maximum so that the effect of the sill predominates over the counterweight and it completes its movement and carries the cam to its lower limit position. In being driven to its opposite limits of movement by the counterbalancing facilities, the linkage system is carried overcenter, and it then becomes impossible to reverse the motion of the linkage except by engaging the cam with the pawl **20**. It is apparent from a consideration of Figs. 2 and 3 that the sill is, in effect, locked in both its bridging and blocking positions. Direct forces on the sill are incapable of dislodging it from these positions.

The operating mechanisms are housed in chambered door posts **40** that flank the entrance to the elevator. Upper channel-shaped housings **41** are provided for the counterweight **35**, its sheaves **36** and operating chain **37**. The linkage is mounted in a suitable housing **42** and, for this purpose, a vertical mounting plate **43** is secured in place in the housing **42** to mount the various parts of the linkage. For example, the sill-operating cam **21** is located on the inside face of the mounting plate while the floating link **28**, operating rod **29**, and releasing link **31** are arranged on the outside face of the mounting plate **43**. The plate **43** is formed with an arcuate clearance slot **44** through which the connection **45** between the cam arm and floating link extends. The releasing link is offset as indicated at **46**, to provide the necessary clearance with the floating link **28**.

While, in the illustrated, preferred embodiment, the gate and sill are mounted on the structure that surrounds the elevator hatch, they could, if desired, both be mounted on the elevator itself, or, by obvious modifications, could be mounted separately; for example, with the gate on the supporting structure and with the sill on the elevator.

The invention is not limited to the disclosed linkage arrangement but includes obvious alternative arrangements apparent to those skilled in this art; however, the simplicity and ruggedness of the disclosed arrangement offers important advantages inasmuch as this equipment is subjected to frequent and rugged loading and must withstand such loading without requiring frequent maintenance.

I claim:

1. In combination, a trucking sill shiftable through an entrance that divides a floor bordering an elevator hatch and a floor shiftable in the hatch to move between a blocking position in the entrance and a bridging position wherein it spans juxtaposed edges of said floors, a single-section gate shiftable vertically in said entrance from a lower blocking position therein to a bridging position thereabove, and an operating mechanism having driving means and driven means drivingly connected to and selectively actuating said driving means, said driven means being engageable with said gate and selectively responsive to the vertical direction of movement thereof and said driving means being engaged with said sill for moving said sill between its blocking and bridging positions conjointly with the movement of said gate between its lower blocking and its upper bridge positions respectively.

2. For use with an elevator having a floor shiftable vertically in a hatch for approximately horizontal alignment with a floor bordering the hatch and forming an entrance between juxtaposed edges of said floors, a trucking sill hingedly mounted on one of said floors adjacent said edges for swinging movement between a blocking position in said entrance nad a bridging position across said edges, a single-section gate shiftable vertically upward in said entrance from a lower blocking position wherein it is supported on one of said floors to an upper bridging position wherein it is spaced above said last-mentioned floor, and an operating mechanism having driving means and driven means drivingly connected to and selectively actuating said driving means, said driven means being engageable with said gate and selectively responsive to the vertical direction of movement thereof and said driving means being engaged with said sill for moving said sill between its blocking and bridging positions conjointly with the movement of said gate between its lower blocking and its upper bridging positions respectively.

3. The arrangement of claim 2 wherein said operating mechanism includes a counterweight suspended to oppose movement of said sill as it moves from blocking position to bridging position, said counterweight balancing the force of said sill when said sill is approximately intermediately between its blocking and bridging positions.

4. The combination with a trucking sill shiftable through an entrance that divides a floor bordering an elevator hatch and a floor shiftable in the hatch to move between a blocking position in the entrance and a bridging position wherein it spans juxtaposed edges of said floors, and a single-section gate shiftable vertically in said entrance between a lower blocking position therein and a bridging position thereabove; of an operating mechanism for moving said sill between its blocking and bridging positions conjointly with the movement of said gate between its blocking and bridging positions respectively, said operating mechanism including a pawl fixedly mounted on said gate, a cam having a fixed pivot point at one end thereof for swinging movement about a substantially central horizontal position and having a fork at the other end thereof opening towards said pawl, said fork having a lower arm engageable with said pawl during a portion of the vertical downward movement of said gate and an upper arm engageable with said pawl during a portion of vertically upward movement of said gate, an operating rod pivotally connected to said sill, and a floating link pivotally connected at its opposite ends to said cam and said rod respectively.

5. The arrangement of claim 4 wherein said operating mechanism includes a releasing link having one end thereof mounted for swinging movement about a fixed pivot and having the other end thereof connected intermediately along the length of said floating link.

6. The arrangement of claim 1 wherein said driven means of said operating mechanism includes a pawl connected ot said gate and reversibly shiftable in response to vertical movement thereof and wherein said driving means includes a sill-operating arm connected to said sill and shiftable to vary the positioning thereof between the blocking and bridging positions.

7. The arrangement of claim 4 wherein said operating mechanism includes a counterweight suspended to oppose movement of said sill as it moves from blocking position to bridging position, said counterweight balancing the force of said sill when said sill is approximately intermediately between its blocking and bridging positions.

8. In combination, a trucking sill positionable across a gap between a fixed floor bordering an elevator hatch and an elevator floor shiftable in said hatch, said sill movable to a blocking position adjacent said gap and to a bridging position over said gap, a fork and link assembly connected to said sill, a single-section gate shiftable vertically upward of said gap to open, and a pawl fastened to said gate and positioned to engage said fork and actuate said link assembly to move said sill to a bridging position when said gate is raised to an open position and to engage said fork and actuate said link assembly to

move said sill to a blocking position when said gate is lowered to a closed position.

9. The combination with a trucking sill positionable across a gap between a fixed floor bordering an elevator hatch and an elevator floor shiftable in said hatch, and a single-section gate shiftable vertically upward of said gap to open; of an operating mechanism for moving said sill from a bridging position to a blocking position, said operating mechanism including a pawl mounted on said gate so as to engage a fork opening toward said pawl, said fork connected by a link assembly to said sill, said fork having one arm engageable with said pawl to drive said link assembly to shift said sill to a bridging position during vertical upward movement of said gate and a second arm engageable with said pawl to drive said link assembly to shift said sill to a blocking position during vertical downward movement of said gate.

10. The combination with a trucking sill positionable across a gap between a fixed floor bordering an elevator hatch and an elevator floor shiftable in said hatch, and a single-section gate shiftable vertically upward of said gap

to open; of an operating mechanism for moving said sill from a blocking position to a bridging position, said operating mechanism including a pawl mounted on said vertically shiftable gate, a fork opening toward said pawl, a link assembly and a sill counterweight, said fork being engageable with said pawl to drive said link assembly, oppose said counterweight, and shift said sill to a bridging position during the vertical upward opening movement of said gate, and the other arm of said fork being engageable with said pawl to drive said link assembly, cooperate with said counterweight, and shift said sill to a blocking position during the vertical downward closing movement of said gate.

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